

REMARKS

Reconsideration of the application in view of the foregoing amendments and following remarks is respectfully requested.

I. Status of the Claims

Claim 1 has been amended. No new matter has been added. Support for the amendment can be found, for example, in FIG. 4 and paragraph [0048] of the publication of the present specification, U.S. Publication No. 2006/0249432.

Claim 33 was previously cancelled without prejudice or disclaimer of the subject matter contained therein.

New claim 42 has been added. No new matter has been added. Support for new claim 24 can be found, for example, in FIG. 4 and paragraph [0044] of the publication of the present specification, U.S. Publication No. 2006/0249432.

Claims 1-32 and 34-42 are currently pending.

II. Claim Rejections Under 35 U.S.C. § 102

Claims 1-3, 4, 6, 8-9, 18-19, 21-24, 26 and 36-41 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 2,651,413 to Daman ("Daman"). This rejection is respectfully traversed.

Independent claim 1 has been amended to recite "an auxiliary agitation blade disposed above the primary rotor and adapted, in use, to induce axial fluid flow in a downward direction so as to supplement a secondary flow induced in the tank by the primary rotor." As shown in FIG. 4 of the present specification, the primary rotor 6 acts as a radial impeller which creates a primary fluid flow F1 and a secondary fluid flow F2 in the tank 2, and the auxiliary agitator 12 axially induces a downward flow that supplements the secondary fluid flow F2. It is respectfully submitted that Daman fails to disclose the auxiliary agitation blade as now recited in claim 1.

In contrast, Daman describes a flotation device having a lower impeller 30 mounted at the bottom of a shaft 23 in close proximity to the bottom of the tank 9 and an upper impeller 31 mounted to the shaft 23 in an intermediate location of cell C. See Daman, FIG. 1 and col. 3, lines 56-63. Each of the impellers 30, 31 are radial flow impellers which generate a radial fluid flow extending from the peripheral edges of the blades. See Daman, FIG. 1. The radial flow generated by upper impeller 31 disperses air radially outward through peripheral apertures 52 of the hood 49 in order to disperse air into the pulp phase; it does not pump slurry axially downward. See Daman, col. 3, line 66 – col. 4, line 3 and col. 4, line 61 – col. 5, line 5.

Dual impeller arrangements such as in Daman, as well as in Ingalls (see below), which have an upper impeller that disperses air into the pulp phase do not supplement a secondary flow of slurry agitated by the primary rotor. This is because the dispersion of air into pulp phase results in a lower density of the surrounding pulp than in the rest of the cell. The slurry cannot flow axially downward since the upper impeller provides buoyancy to the slurry by dispersing air therein and decreasing its density. Accordingly, the slurry flows radially outward and upward from the upper impeller toward the surface of the cell.

Thus, the upper impeller 31 does not generate axial fluid flow in a downward direction, but rather radial fluid flow. Moreover, even if such a fluid flow were to exist, the lower impeller 30 does not generate a secondary fluid flow which would be supplemented by it. In effect, the lower impeller 30 is isolated from the upper impeller 31. Since an enclosure (i.e., flanged or flaring hood portion 41) is provided over the top of the lower impeller 30 in close proximity to the blades, the radial fluid flow would not be drawn to the top of the lower impeller by vortex action as in the secondary fluid flow of the present invention; rather, the lower impeller 30 draws fluid from a separate feed compartment 12 through feed conduit 22 extending into the enclosure. See Daman, Fig. 1 and col. 4, lines 20-30.

In the Office Action, the Examiner cites a second embodiment of the upper impeller 31m shown in FIG. 6 of Daman which provides fluid flow with a downward and outward component. See Detailed Action, Paragraph 2. However, in this embodiment, there is no blade which generates

axial fluid flow as recited in claim 1; rather, gas supplied from bonnet 55 enters through intake 51m into passage 70 which directs fluid flow downward and outward. See Daman, Fig. 6, col. 5, lines 17-23 and col. 8, lines 68-74. Additionally, as argued above, since the slurry is less dense due to the dispersion of air, it will float to the top of the cell rather than supplement a flow of slurry induced by the lower impeller proximate the bottom of the cell. Lastly, in any case, as set forth above, there is no secondary flow in Daman that would be supplemented by such fluid flow at upper impeller 31 anyway.

Because Daman at least fails to disclose the above-recited features, it cannot anticipate claim 1, or claims 2, 3, 4, 6, 8-9, 18-19, 21-24, 26 and 36-41 depending from claim 1, or otherwise requiring all the limitations thereof. Reconsideration and withdrawal of the rejections of claims 1-3, 4, 6, 8-9, 18-19, 21-24, 26 and 36-41 under 35 U.S.C. § 102(b) based on Daman is therefore respectfully requested.

Claims 1-9, 18-24, 26 and 36-41 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 2,232,388 to Ingalls et al. ("Ingalls"). This rejection is respectfully traversed.

As set forth above, independent claim 1 has been amended to recite "an auxiliary agitation blade disposed above the primary rotor and adapted, in use, to induce axial fluid flow in a downward direction so as to supplement a secondary flow induced in the tank by the primary rotor." It is respectfully submitted that Ingalls likewise fails to disclose the auxiliary agitation blade as now recited in claim 1.

In contrast, Ingalls does not describe a secondary flow. In Ingalls, an additional impeller 57 located below a down-thrusting impeller 59 is configured as a pump. See Ingalls, FIGS. 8 and 9 and page 3, col. 2, lines 43-48. A central passage 64 in the lower disc 63 draws fluid from the bottom opening 56. See Ingalls, Fig. 9. As in Daman, the blades 66 of the lower impeller 57 of Ingalls are covered at the top such that the fluid flow dispersed radially outwardly would not be drawn to the top of the lower impeller 57 by vortex action as in the secondary fluid flow of the present invention. See Ingalls, FIG. 9. Instead, the lower impeller 57 operates as a pump and creates only a primary radial flow from the fluid which is pumped only through the central opening 64 at the bottom of the

lower impeller 57. On the basis of this configuration of the lower impeller, it is respectfully submitted that there is no secondary fluid flow in Ingalls that could be supplemented by any flow induced by the upper impeller 59.

Moreover, as in Daman, the upper impeller 59 of Ingalls is provided to disperse air into the pulp phase and not to pump axially downwards. See Ingalls, page 3, col. 1, lines 32-35. As argued above, where an upper impeller is provided to disperse air into the pulp phase, such an impeller does not supplement a secondary flow of slurry agitated by the primary rotor. This is because the dispersion of air into pulp phase results in a lower density of the surrounding pulp than in the rest of the cell. The slurry cannot flow axially downward since the upper impeller provides buoyancy to the slurry by dispersing air therein and decreasing its density. Accordingly, the slurry will flow radially outward and upward from the upper impeller toward the surface of the cell.

Because Ingalls at least fails to disclose the above-recited features, it cannot anticipate claim 1, or claims 2-9, 18-24, 26 and 36-41 depending from claim 1, or otherwise requiring all the limitations thereof. Reconsideration and withdrawal of the rejections of claims 1-9, 18-24, 26 and 36-41 under 35 U.S.C. § 102(b) based on Daman is therefore respectfully requested.

III. Claim Rejections Under 35 U.S.C. § 103

Claims 10, 13 and 14 were rejected under 35 U.S.C. § 103(a) as obvious over Ingalls in view of U.S. Patent No. 2,573,521 to Wasley et al. ("Wasley"). This rejection is respectfully traversed.

As set forth above, independent claim 1 has been amended to recite "an auxiliary agitation blade disposed above the primary rotor and adapted, in use, to induce axial fluid flow in a downward direction so as to supplement a secondary flow induced in the tank by the primary rotor." It is respectfully submitted that Ingalls and Wasley, alone or in combination, fail to disclose or suggest the auxiliary agitation blade as now recited in claim 1.

As set forth above, Ingalls fails to disclose or suggest a primary rotor that induces a secondary flow. Likewise, Wasley fails to disclose or suggest such a primary rotor. Rather, the

lower impeller 18 of Wasley is configured as an axial impeller with fan-like blades 19 that cause a downward fluid flow into the squirrel cage of vertical bars 20. See Wasley, FIG. 1 and col. 2, lines 44-53. Thus, there is no primary or secondary radial flow as is generated by the radial primary rotor of the present invention; instead, there is merely an axial flow. Moreover, since the lower impeller 18 is covered entirely at its upper end by upper portion 22 from the rest of the tank, any fluid flow within the tank of Wasley could not possibly return to the top of the impeller 18 such that it could be supplemented. See Wasley, FIG. 1 and col. 2 line, 53 - col. 3, line 2.

Also like Ingalls, Wasley describes a flotation apparatus with upper air screw vanes 26 which disperse air into the pulp phase. See Wasley, col. 3, lines 37-45. As argued above, where an upper impeller is provided to disperse air into the pulp phase, such an impeller does not supplement a secondary flow of slurry agitated by the primary rotor. This is because the dispersion of air into pulp phase results in a lower density of the surrounding pulp than in the rest of the cell. The slurry cannot flow axially downward since the upper impeller provides buoyancy to the slurry by dispersing air therein and decreasing its density. Accordingly, the slurry will flow radially outward and upward from the upper impeller toward the surface of the cell.

Since Ingalls and Wasley, alone or in combination, at least fail to disclose or suggest the above-recited features of claim 1, they cannot render claims 10, 13 and 14 depending therefrom obvious. Reconsideration and withdrawal of the rejections to claims 10, 13 and 14 under 35 U.S.C. § 103(a) as obvious over Ingalls in view of Wasley is therefore respectfully requested.

Claims 11 and 12 were rejected under 35 U.S.C. § 103(a) as obvious over Ingalls in view of Wasley, and in further view of any one of U.S. Patent No. 5,607,235 to Campbell ("Campbell"); U.S. Patent No. 4,478,515 to Tobin ("Tobin"); and U.S. Patent No. 2,600,408 to Komarek ("Komarek"). This rejection is respectfully traversed.

As set forth above, independent claim 1 has been amended to recite "an auxiliary agitation blade disposed above the primary rotor and adapted, in use, to induce axial fluid flow in a downward direction so as to supplement a secondary flow induced in the tank by the primary rotor."

It is respectfully submitted that Ingalls, Wasley, Campbell, Tobin and Komarek, alone or in combination, fail to disclose or suggest the auxiliary agitation blade as now recited in claim 1.

As set forth above, Ingalls and Wasley, alone or in combination, fail to disclose or suggest at least the above-recited features of claim 1. Likewise, it is respectfully submitted that Campbell, Tobin and Komarek fail to disclose or suggest the auxiliary agitation blade for a flotation device as now recited in claim 1; in fact, Campbell, Tobin and Komarek do not describe a flotation device at all. Rather, Campbell is directed to a shaft for a blender having a plurality of triangular shaped tools 10. See Campbell, FIG. 11. Because the blender operates at extremely high-speeds, fluid flow is highly turbulent, and it is respectfully submitted that such a device would have no application to an industrial flotation apparatus for slurry agitation. See Campbell, col. 1, lines 34-46. In any case, there is no primary rotor in Campbell inducing a secondary fluid flow, nor can any fluid flow be supplemented or provided axially downwards where fluid flow is turbulent. Tobin, on the other hand, describes a mixing drum 12 having successively-arranged blades which divide, separate and recombine material entering the mixing drum. See Tobin, FIG. 1, Abstract. However, no secondary fluid flow is induced, nor is any fluid flow supplemented, due to the successive arrangement of the blades and the rolling action of the drum. Similar to Campbell, Komarek describes a series of blades 22 disposed along a shaft for mixing at high speeds and axially directing material out a gate 18 at one end; no primary or secondary radial flow is produced, nor is any flow supplemented. See Komarek, FIG. 1 and col. 3, lines 15-33. Furthermore, as in Campbell, it is respectfully submitted that blades designed for small load and high speed would not be recognized by an ordinarily skilled artisan as a possible replacement for blades in an industrial flotation apparatus.

Since Ingalls, Wasley, Campbell, Tobin and Komarek, alone or in combination, at least fail to disclose or suggest the above-recited features of claim 1, they cannot render claims 11 and 12 depending therefrom obvious. Reconsideration and withdrawal of the rejections of claims 11 and 12 under 35 U.S.C. § 103(a) as obvious over Ingalls in view of Wasley, and in further view of Campbell, Tobin or Komarek, is therefore respectfully requested.

Claims 15-17 and 27 were rejected under 35 U.S.C. § 103(a) as obvious over Ingalls in view of either one of U.S. Patent No. 2,673,724 to Potts (“Potts”) or U.S. Patent No. 2,973,095 to Anderson et al. (“Anderson”). This rejection is respectfully traversed.

As set forth above, independent claim 1 has been amended to recite “an auxiliary agitation blade disposed above the primary rotor and adapted, in use, to induce axial fluid flow in a downward direction so as to supplement a secondary flow induced in the tank by the primary rotor.” It is respectfully submitted that Ingalls, Potts and Anderson, alone or in combination, fail to disclose or suggest the auxiliary agitation blade as now recited in claim 1.

As set forth above, Ingalls fails to disclose or suggest at least the above-recited features of claim 1. Likewise, it is respectfully submitted that Potts and Anderson fail to disclose or suggest the auxiliary agitation blade for a flotation device as now recited in claim 1. In contrast, Potts and Anderson each describe flotation devices having a lower, primary rotor only; no auxiliary agitation blade is provided. See Potts, FIG. 1 and Anderson, FIG. 1.

Since Ingalls, Potts and Anderson, alone or in combination, at least fail to disclose or suggest the above-recited features of claim 1, they cannot render claims 15-17 and 27 depending therefrom, or otherwise requiring all the limitations thereof, obvious. Reconsideration and withdrawal of the rejections of claims 15-17 and 27 under 35 U.S.C. § 103(a) as obvious over Ingalls in view of Potts or Anderson is therefore respectfully requested.

Claim 25 was rejected under 35 U.S.C. § 103(a) as obvious over Ingalls in view of U.S. Patent No. 2,182,442 to Booth (“Booth”). Claim 25 was also rejected under 35 U.S.C. § 103(a) as obvious over Daman in view of U.S. Patent No. 2,628,827 to Daman (“Daman II”). These rejections are respectfully traversed.

As set forth above, independent claim 1 has been amended to recite “an auxiliary agitation blade disposed above the primary rotor and adapted, in use, to induce axial fluid flow in a downward direction so as to supplement a secondary flow induced in the tank by the primary rotor.”

It is respectfully submitted that Ingalls, Booth, Daman and Daman II, alone or in combination, fail to disclose or suggest the auxiliary agitation blade as now recited in claim 1.

As set forth above, Ingalls and Daman fail to disclose or suggest at least the above-recited features of claim 1. Likewise, it is respectfully submitted that Booth and Daman II fail to disclose or suggest the auxiliary agitation blade for a flotation device as now recited in claim 1. In contrast, Booth describes a flotation device with a lower, primary rotor only, not auxiliary agitation blade is provided. See Booth, FIG. 2. Daman II is similar to Daman and likewise does not include a lower impeller that generates a secondary fluid flow since the top of the blades of the lower impeller 17 are closely covered at their top. See Daman II, FIG. 1. Also like Daman, Daman II the upper agitators 42 are provided to disperse air into the pulp phase. See Daman II, col. 3, lines 42-49. Moreover, fluid flow in Daman II above the lower impeller 17 is isolated from the rest of the tank by a wall extending above the top fluid level so any fluid flow generated in the tank could not be supplemented by an impeller located further up on the shaft. See Daman II, FIG. 1.

Since Ingalls, Booth, Daman and Daman II, in any combination, at least fail to disclose or suggest the above-recited features of claim 1, they cannot render claim 25, requiring all the limitations of claim 1, obvious. Reconsideration and withdrawal of the rejections of claim 25 under 35 U.S.C. § 103(a) as obvious over Ingalls in view of Booth, and as obvious over Daman in view of Daman II, is therefore respectfully requested.

Claims 30-32 and 34 were rejected under 35 U.S.C. § 103(a) as obvious over either one of Daman or Ingalls in view of either one of Booth or U.S. Patent No. 5,909,022 to Bourke et al. ("Bourke"). This rejection is respectfully traversed.

As set forth above, independent claim 1 has been amended to recite "an auxiliary agitation blade disposed above the primary rotor and adapted, in use, to induce axial fluid flow in a downward direction so as to supplement a secondary flow induced in the tank by the primary rotor." It is respectfully submitted that Daman, Ingalls, Booth and Bourke, alone or in combination, fail to disclose or suggest the auxiliary agitation blade as now recited in claim 1.

As set forth above, Daman, Ingalls and Booth, alone or in combination, fail to disclose or suggest at least the above-recited features of claim 1. Likewise, it is respectfully submitted that Bourke fails to disclose or suggest the auxiliary agitation blade for a flotation device as now recited in claim 1. In contrast, Bourke only describes a lower, primary rotor; no auxiliary agitation blade is provided. See Bourke, FIG.

Since Daman, Ingalls, Booth and Bourke, in any combination, at least fail to disclose or suggest the above-recited features of claim 1, they cannot render claims 30-32 and 34, requiring all the limitations of claim 1, obvious. Reconsideration and withdrawal of the rejections of claims 30-32 and 34 under 35 U.S.C. § 103(a) as obvious over either one of Daman or Ingalls in view of either one of Booth or Bourke is therefore respectfully requested.

Claim 35 was rejected under 35 U.S.C. § 103(a) as obvious over either one of Daman or Ingalls in view of either one of Booth or Bourke, and in further view of International Publication No. WO 01/43881 to Schommarz ("Schommarz"). This rejection is respectfully traversed.

As set forth above, independent claim 1 has been amended to recite "an auxiliary agitation blade disposed above the primary rotor and adapted, in use, to induce axial fluid flow in a downward direction so as to supplement a secondary flow induced in the tank by the primary rotor." It is respectfully submitted that Daman, Ingalls, Booth and Bourke, alone or in combination, fail to disclose or suggest the auxiliary agitation blade as now recited in claim 1.

As set forth above, Daman, Ingalls, Booth and Bourke, in any combination, fail to disclose or suggest at least the above-recited features of claim 1. Likewise, it is respectfully submitted that Schommarz fails to disclose or suggest the auxiliary agitation blade for a flotation device as now recited in claim 1. In contrast, Schommarz only describes a lower, primary rotor; no auxiliary agitation blade is provided. See Schommarz, FIGS. 1-4.

Since Daman, Ingalls, Booth, Bourke and Schommarz, in any combination, at least fail to disclose or suggest the above-recited features of claim 1, they cannot render claim 35, requiring all the limitations of claim 1, obvious. Reconsideration and withdrawal of the rejection of claim 35

under 35 U.S.C. § 103(a) as obvious over either one of Daman or Ingalls in view of either one of Booth or Bourke, and in further view of Schommarz is therefore respectfully requested.

IV. New Claim

New claim 42 has been added. No new matter has been added. Support for new claim 24 can be found, for example, in FIG. 4 and paragraph [0044] of the publication of the present specification, U.S. Publication No. 2006/0249432.

As argued above, it is respectfully submitted that claim 1 would be allowable over the cited prior art in its present form, and that new claim 42 would be allowable at least because it depends from claim 1. However, it is respectfully submitted that claim 42 is further distinguishable from the cited prior art since it recites that the auxiliary agitation blade is part of an axial impeller.

CONCLUSION


In view of the foregoing amendments and arguments, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

If there are any other issues remaining which the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

The Commissioner is hereby authorized to charge any unpaid fees deemed required in connection with this submission, including any additional filing or application processing fees required under 37 C.F.R. § 1.16 or 1.17, or to credit any overpayment, to Deposit Account No. 04-0100.

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Respectfully submitted,

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